



# Technology Integration Overview

June 7, 2016

Linda Bluestein (Presenter)  
Connie Bezanson

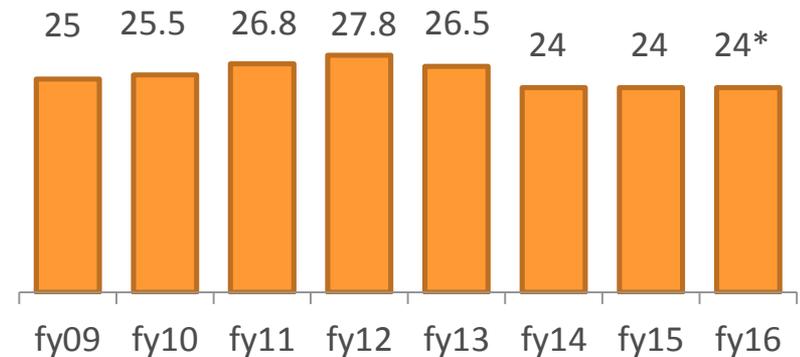
## Activities

- VT Deployment (Clean Cities) – A voluntary, locally based government/industry partnership initiative.
- Legislative and Rulemaking.
- Advanced Vehicle Competitions.



- ❑ Increase use of higher-efficiency advanced technology vehicles.
- ❑ Increase use of vehicles that use renewable, low-carbon, domestic fuels and infrastructure.
- ❑ Improve overall efficiency of the transportation system.
- ❑ Support national goals to reduce GHG emissions by 17% by 2020; 26-28% by 2025 and 83% by 2050 (vs 2005 baseline).

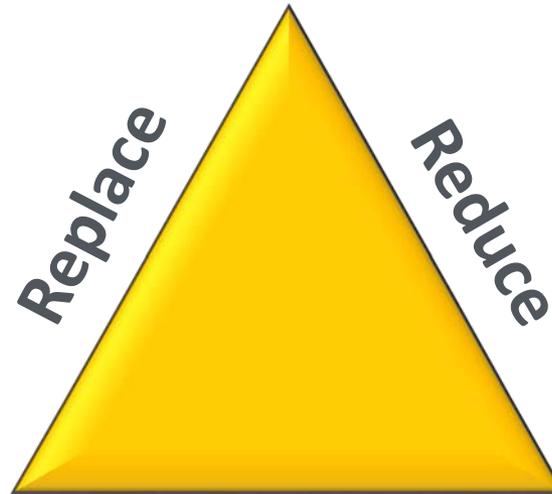
*Clean Cities Base Budget History*



\*Base budget: Additional \$10M in FY16 for Alternative Fuel Vehicle Community Partner Projects, per Congressional direction

## Low-Carbon Fuels

Electric Vehicles  
Biodiesel  
Ethanol  
Drop-in fuels  
Hydrogen  
Gaseous Fuels



**Eliminate**

## Idle Reduction

Heavy-Duty Trucks  
School & Transit  
Buses  
Light-Duty Vehicles

**New Area of  
Emphasis:  
Holistic  
Transportation  
System view, smart  
cities**

## Fuel Economy

More Fuel efficient  
vehicles, adopting  
smarter driving and  
vehicle purchasing habits



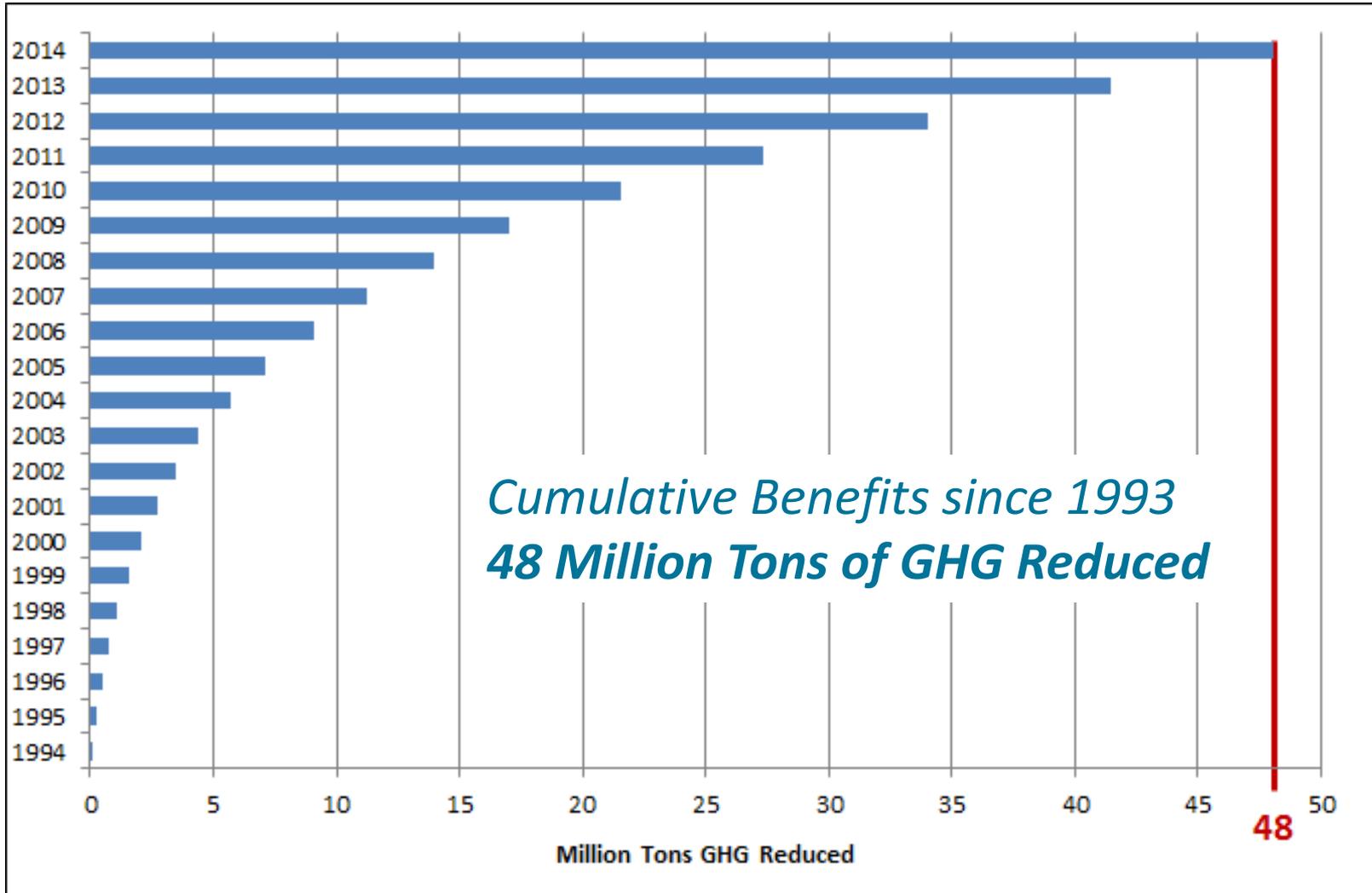
## Hybrids

Light- and heavy-duty  
Electric hybrids  
Plug-In hybrids

# VT Deployment: Accomplishments (GHG Reduction)

## 2014 Accomplishments:

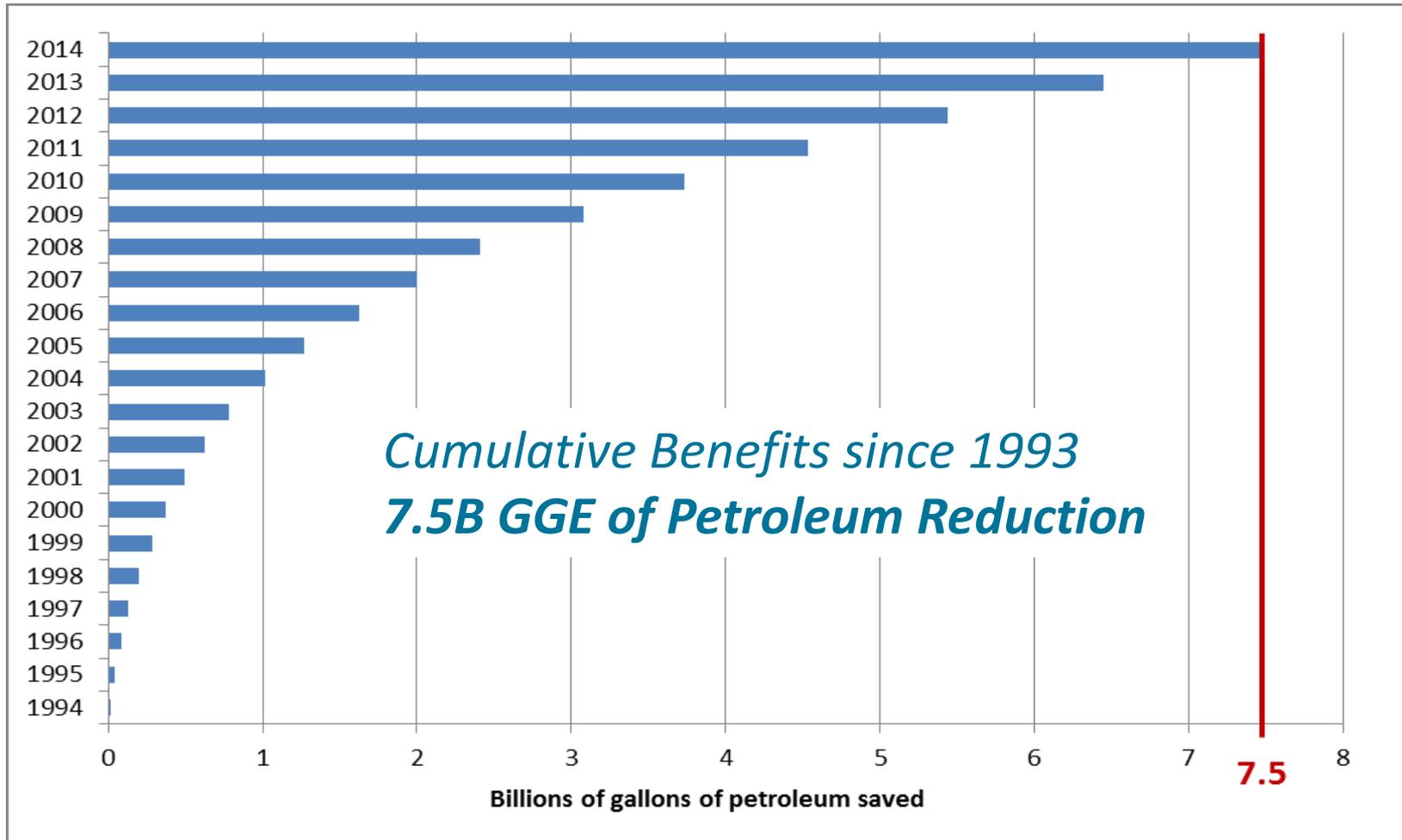
- ❑ 1 Billion GGE reduction and **6.6 Million Tons GHG reduced.**
- ❑ Equivalent to removing 1.5 million cars from the road.



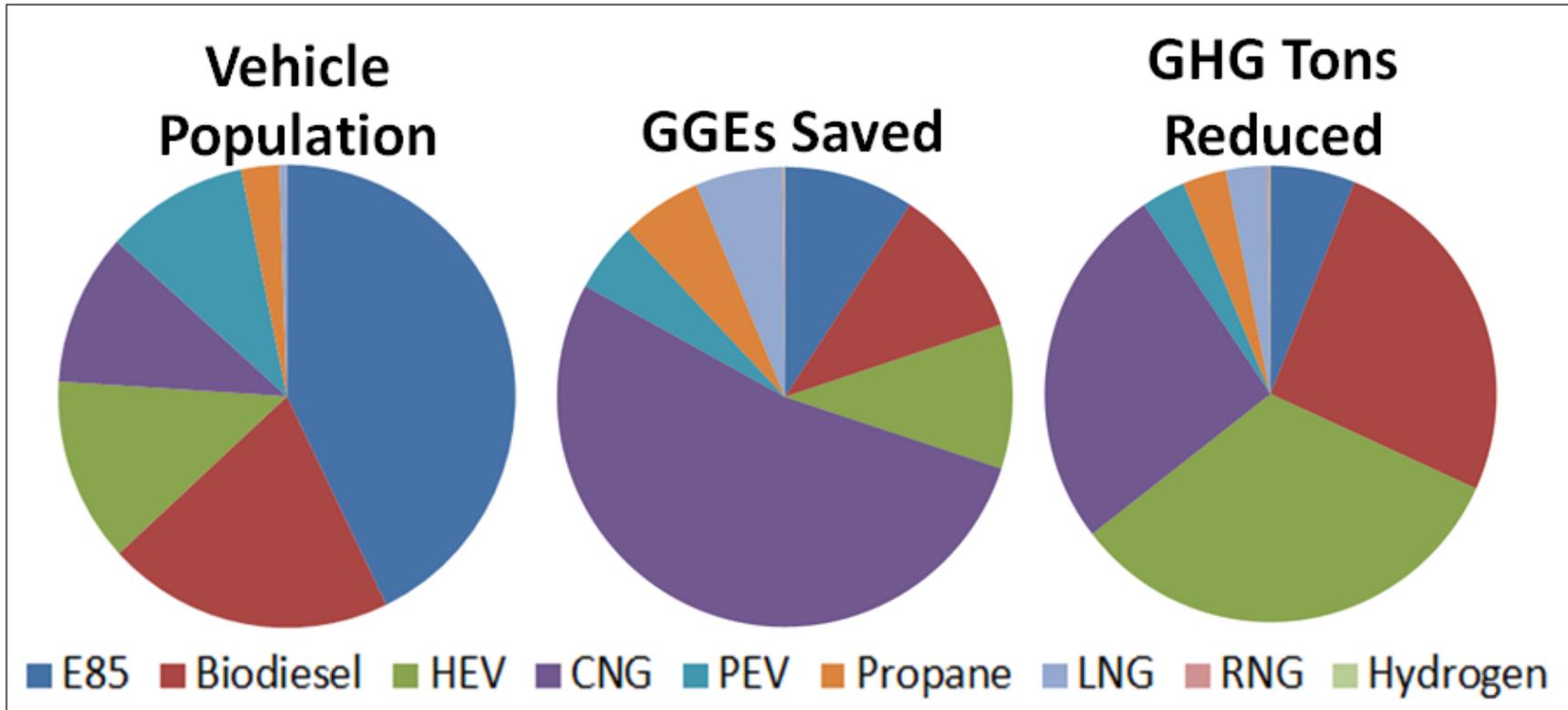
# VT Deployment: Accomplishments (Petroleum Reduction)

## 2014 Accomplishments:

- ❑ **1 Billion GGE reduction** and 6.6 Million Tons GHG reduced.
- ❑ Equivalent to removing 1.5 million cars from the road.



## *VT Deployment Accomplishments by Alternative Fuel*



# Who's Who in Clean Cities - DOE

## DOE Headquarters (HQ)



Dennis Smith  
Director



Linda Bluestein  
Co-Director



Shannon Shea  
Communications  
Manager



Mark Smith  
National Partners  
Manager



Nick Bleich  
Workplace Charging  
Challenge

★ Leveraging  
CC team &  
stakeholders

## DOE Regional Managers National Energy Technology Laboratory (NETL)



Dan Nardozzi  
Northwest



Dave Kirschner  
North Central



Darren Stevenson  
Mid-Atlantic



Erin Russell-Story  
Northeast



Brett Aristegui  
California



Neil Kirschner  
South Central



Trev Hall  
Southeast

# VT Deployment Strategy (Leveraging People & Resources)



## Implement national policies and initiatives by facilitating change

Provide a national unbiased source of information.

Provide tools, experts to address barriers and solve problems.

Develop corporate partnerships with industry and national fleets as well as public fleet partners—federal, state, regional and local – to increase awareness and publicize success through mass media and outreach.

Provide financial assistance to jump start markets and incentivize private investment.

# Clean Cities Deployment Efforts include 5 Major Activities



**Consumer Information, Outreach, and Education:** *DOE-developed tools help consumers save money on fuel cost and help fleets understand their options for cost-effective alternatives to gasoline and diesel fuel (includes FE.gov and AFDC).*



**Technical & Problem Solving Assistance:** *DOE experts help leaders address permitting and safety issues, technology shortfalls, and other project implementation barriers.*



**Training and Stakeholder Coordination:** *DOE helps convene key community, industry, and business leaders to develop and implement projects, leverage resources, address local barriers, and assure relevant workforce development.*



**Identification/Tracking of Essential Program Metrics:** *Coalitions track local/regional market conditions, facilitate infrastructure development, share best practices and lessons-learned.*

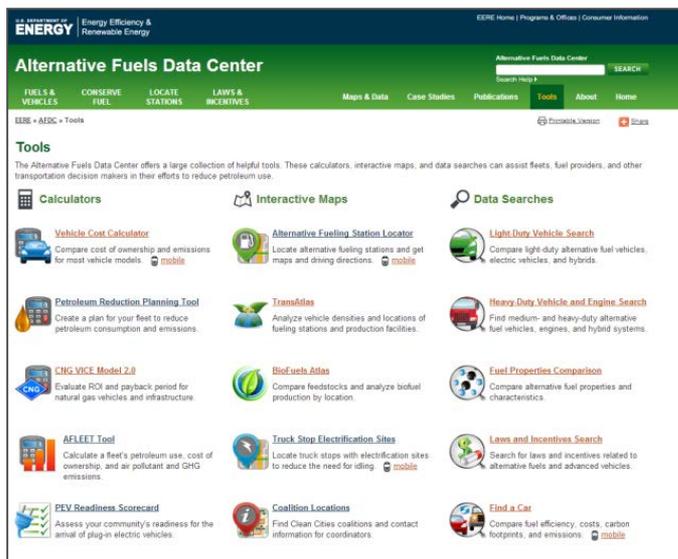


**Competitively-Awarded Financial Assistance:** *Federal cost-share encourages initial private sector match and long-term investment.*



# Consumer Information, Outreach, and Education

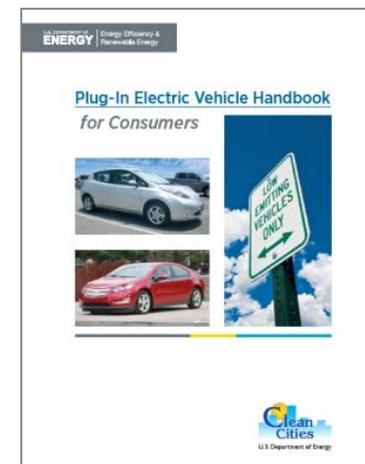
- ❑ Non-biased source of VT data and information.
- ❑ Fuel Economy Guide (FE.gov), Alt-Fuel Data Center (AFDC).
- ❑ Online tools and cost calculators, other web resources.
- ❑ Fact Sheets, publications, handbooks, success stories.
- ❑ Technical Response Service and Hotline.
- ❑ Public workshops, webinars, industry technical conferences.



Online Tools



Technical Response Service



Publications



# Tools, Publications, Data and Mobile Apps

## *Fueleconomy.gov*

Enables consumers to find the fuel-efficient vehicle that meets their needs, as well as save gas and money with their current vehicles.



## *Alternative Fuels Data Center*

Helps fleets choose the right alternative fuel or other petroleum reduction approach for them, with almost 100 case studies and 14 interactive tools.



## Calculators



### Vehicle Cost Calculator

Compare cost of ownership and emissions for most vehicle models.  [mobile](#)



### Petroleum Reduction Planning Tool

Create a plan for your fleet to reduce petroleum consumption and emissions.



### CNG VICE Model 2.0

Evaluate ROI and payback period for natural gas vehicles and infrastructure.



### AFLEET Tool

Calculate a fleet's petroleum use, cost of ownership, and air pollutant and GHG emissions.



### JOBS Model

Estimate economic impacts of natural gas, hydrogen, or fuel cell infrastructure.



## Interactive Maps



### Alternative Fueling Station Locator

Locate alternative fueling stations and get maps and driving directions.  [mobile](#)



### TransAtlas

Analyze vehicle densities and locations of fueling stations and production facilities.



### BioFuels Atlas

Compare feedstocks and analyze biofuel production by location.



### Truck Stop Electrification Sites

Locate truck stops with electrification sites to reduce the need for idling.  [mobile](#)



### Coalition Locations

Find Clean Cities coalitions and contact information for coordinators.



## Data Searches



### Vehicle Search

Compare all classes of alternative fuel vehicles, electric vehicles, and hybrids.



### Laws and Incentives Search

Search for laws and incentives related to alternative fuels and advanced vehicles.



### Fuel Properties Comparison

Compare alternative fuel properties and characteristics.



### Find a Car

Compare fuel efficiency, costs, carbon footprints, and emissions.  [mobile](#)



### State Information

Find state information about alternative fuels and advanced vehicles.

[www.afdc.energy.gov/tools](http://www.afdc.energy.gov/tools)

## Calculators



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Compare cost of ownership and emissions for most vehicle models.  [mobile](#)

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## Data Searches



### Vehicle Search

Compare all classes of alternative fuel vehicles, electric vehicles, and hybrids.



### Petroleum Reduction Planning Tool

Create a plan for your fleet to reduce petroleum consumption and emissions.



### TransAtlas

Analyze vehicle densities and locations of alternative fueling stations.



### Laws and Incentives Search

Search for laws and incentives related to advanced vehicles.



### CNG VIC

Evaluate natural gas vehicle options.



## Petroleum Reduction Planning Tool

# Create a plan for your fleet to reduce petroleum consumption and emissions.



### AFLEE

Calculate a fleet's petroleum use, cost of ownership, and air pollutant and GHG emissions.



Locate truck stops with electrification sites to reduce the need for idling.  [mobile](#)



Compare fuel efficiency, costs, carbon footprints, and emissions.  [mobile](#)



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### TransAtlas



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### Comparison

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### CNG Vehicle

Evaluate natural gas vehicle properties and



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# Technical and Problem Solving Assistance



- ❑ Capture lessons learned and develop best practices.
- ❑ Technical Forums and User Groups.
- ❑ Address unforeseen permitting and safety issues.
- ❑ Identify chronic vehicle or infrastructure field problems.
- ❑ Incident investigations (learn from failures).

## Model EVSE Permit

### Application for Installation of Electric Vehicle Charging Equipment

**NOTICE:** The system must be installed in compliance with the National Electric Code® (NFPA 70, Article 625 Electric Vehicle Charging System or applicable electrical code currently adopted and enforced within the jurisdiction of installation. All associated work with circuits, electrical service and meters shall be completed in compliance with NFPA 70, national electric code, or applicable electrical code currently adopted and enforced within the jurisdiction of installation.

#### Section 1: Permit Applicant Information

Name:		
Installation Street Address (P.O. box not acceptable):	Contact Person:	Phone Number:
City:	County:	State:
		ZIP Code:
Owner Name:	Street Address:	Phone Number:
City:	State:	ZIP Code:
Submitter's Name/Company:	Street Address:	Phone Number:
City:	State:	ZIP Code:
General description of equipment to be installed:		

#### Section 2: Permit Code Information

Requirements for wiring a charging station are taken directly out of the 2011 edition of the National Electrical Code® (NEC) NFPA 70, Article 625 Electric Vehicle Charging System. This article does not provide all of the information necessary for the installation of electric vehicle charging equipment. Please refer to the current edition of the electrical code adopted by the local jurisdiction for additional installation requirements. Reference to the 2011 NEC may be made at [www.nfpa.org/70](http://www.nfpa.org/70).

NEC Chapter or Article	DESCRIPTION
Chapter 2 and 3	<b>Branch Circuit</b> A new electrical box added on a branch circuit shall comply with NFPA 70 National Electrical Code: Chapter 2 Wiring and Protection and Chapter 3 Wiring Methods and Materials and all administrative requirements of the NEC or the electrical code in effect in the jurisdiction.
625.4	<b>VOLTAGES</b> Unless other Voltages are specified, the nominal ac system voltages of 120, 120/240, 208Y/120, 240, 480Y/277, 480, 600Y/347, and 600 Volts shall be used to supply equipment.
625.5	<b>LISTED OR LABELED</b> All electrical materials, devices, fittings, and associated equipment shall be listed or labeled.



# Partnerships: Media Partners Help us Reach the Masses



- ❑ >200 professionally produced segments to date on EVs, alt-fuels, advanced vehicles, fuel economy, EcoCAR, and other VTO highlights.
- ❑ Bi-weekly Clean Cities success stories.
- ❑ Programs air on PBS, Discovery, Velocity, and American Forces Network worldwide on allied military bases.
- ❑ Features available on Clean Cities' websites and  channel.



# Partnerships: National Clean Fleets (NCFP)

*Working with top fleets across the country to reduce petroleum/GHG footprint*

## 27 Partners



# Partnerships: National Parks Interagency Agreement (Since 2010)

- ❑ Provides Technical & Financial Assistance to NPS for **high visibility** transportation projects in National Park Properties to:
  - Support the operation of AFVs and GHG reduction goals.
  - Conduct appropriate training, outreach, and educational programs for Park Visitors, Rangers, and other NPS employees.
  - Call attention to NPS success stories and benefits achieved.
  - Leverage resources with NPS and private sector partners.



# Financial Assistance: 2016 Announcements

## 2 Aggregate Purchasing Project awards (\$3.0M) – FY15 announced Jan 2016

- ❑ CALSTART – (focus on ZEV/MOU states):
  - Develops a cooperative EV purchasing process for state and local government fleets.
  - Goal of facilitating 10,000 EV sales annually.
- ❑ National Assn. of Regional Councils:
  - Develops national and regional group contracting agreements.
  - Includes multiple EPAAct-defined alternative fuel vehicle types.

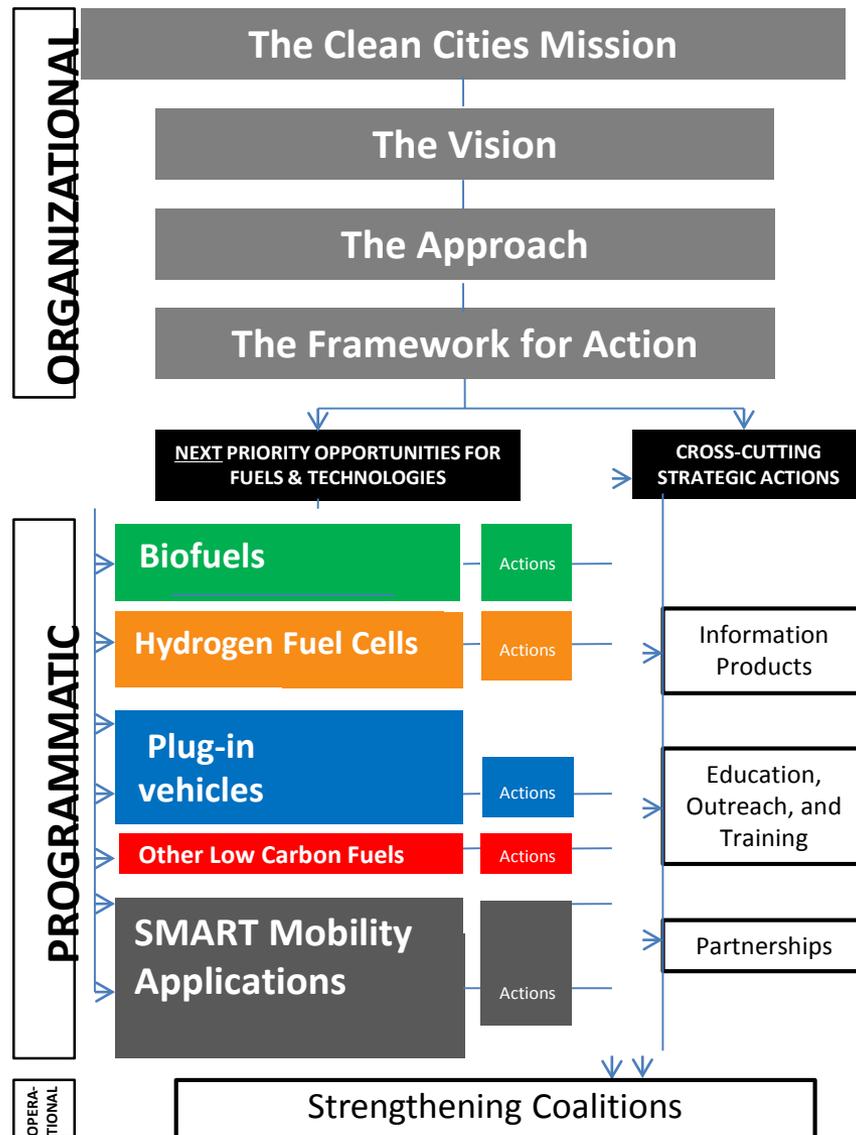
## FY16 broad FOA – Two Deployment topics (out of 11)

- ❑ ***EV Everywhere Plug-In Electric Vehicle Local Showcases (\$2.5M)*** – seeks to establish local demonstration centers that will provide a hands-on consumer experience and in-depth education for commercially available PEVs and EVSE.
- ❑ ***Alternative Fuel Vehicle Workplace Safety Programs (\$1.5M)*** – to provide safety training and workshops related to garage facility/building upgrades that are required for gaseous fuels (natural gas, propane, and hydrogen).

## FY16 Multi-Topic FOA – Alternative Fuel Vehicle Community Partner Projects (\$10M)

- ❑ *Coming Soon. Supports highly-leveraged public-private partnerships to significantly accelerate alternative fuel use.*

# Clean Cities Strategic Plan Overview



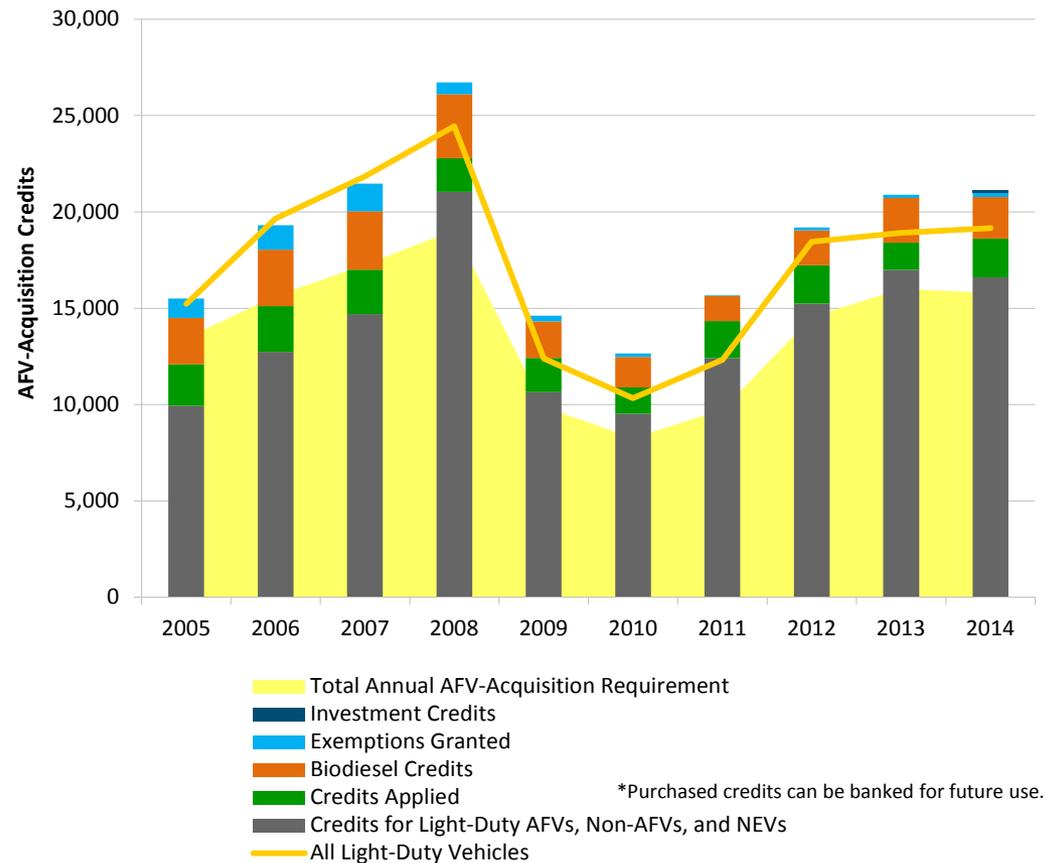
# Clean Cities 2015-2016 Notable Accomplishments

- ❑ National Partners saved 81 million GGEs of petroleum.
- ❑ Updated AFLEET tool (Alternative Fuel Life Cycle Environmental and Economic Transportation); 5,000 users.
  - AFLEET calculates a fleet’s petroleum use, cost of ownership and air pollutant and GHG emissions.
- ❑ Adding Transportation as a System (TaaS) activities to Clean Cities portfolio.
- ❑ Supporting partnership with DOT on Smart Cities Challenge; participating in DOE/DOT MOU.
  - Clean Cities coalitions are engaged with seven Smart Cities finalists.
- ❑ Relaunched popular Alternative Fuel Price Report available on AFDC website.

# State and Alternative Fuel Provider Fleet Regulatory Activities

- ❑ EPA Act requires State fleets and Alternative Fuel Provider fleets to acquire AFVs, deploy fuels.
- ❑ Implementing program revisions providing credit for acquisitions of non-AFV electric drive vehicles, and investments in infrastructure, emerging technologies, etc.
- ❑ Management of legislative and regulatory activities for VTO, including designation of alternative fuels.

## Standard Compliance Methods



*Consistent 100% Program Compliance by Covered State and Alternative Fuel Provider Fleets*

# Training the Next Generation of Engineers

## Advance Vehicle Technology Competitions

Provide a new generation of engineers with knowledge and skills in developing and commercializing advanced automotive technologies.



Senator Albert Gore, Jr. (D-TN) congratulates Cameron Sumner of the University of Tennessee. Tennessee came in first place in the GM/SAE Methanol Marathon with a cumulative score of 764 points. The 1,100-mile, five-day rally came to a conclusion on Ceptol Hill on May 4.

General Motors Public Relations (202)775-5040



# Our Impact

- ❑ 93 North American universities have participated since 1989.
- ❑ 531 individual university teams have competed.
- ❑ More than 16,500 students have participated.
- ❑ 83% of AVTC graduates have entered the automotive industry.
- ❑ 69 patent applications submitted by AVTC graduates.



*President Obama visits the Ohio State University EcoCAR team*

**OEMs**

**Suppliers**

**Software Cos.**

**Academia**

**Government**

# EcoCAR3

- ❑ 4 year competition (2014 – 2018).
- ❑ Based on a real-world vehicle design process.
- ❑ 16 Teams are challenged to reduce the environmental impact of a GM-donated vehicle by minimizing the vehicle's fuel consumption and reducing its emissions.
- ❑ Consider cost and explore innovation.
- ❑ All while retaining the vehicle's performance, safety, and consumer appeal.



- ❑ DOE is teaming with General Motors and more than 30 other government and industry leaders.

# Year 2 Competition: Yuma, AZ and San Diego, CA



- ❑ May 16 – 21, 2016.
- ❑ Safety and technical inspections and Vehicle testing at the GM Desert Proving Grounds in Yuma, AZ.
- ❑ In San Diego, teams will participate in more than a dozen technical, communications, and project management presentations highlighting their activities.

## 16 North American Universities

Arizona State University  
California State University – LA  
Colorado State University  
Embry-Riddle Aeronautical University  
Georgia Institute of Technology  
McMaster University  
Mississippi State University  
Ohio State University  
Pennsylvania State University  
University of Tennessee, Knoxville  
University of Alabama  
University of Washington  
University of Waterloo  
Virginia Tech  
Wayne State University  
West Virginia University

# Summary

**Focus continues on tools, resources, education and supporting local coalitions that can help bring new petroleum reduction projects to market.**

- ❑ Biggest factor: GHG reduction and sustainability.
- ❑ Strategic Planning important to set goals and objectives for the program for the next five years and beyond; allows stakeholders to help SMART drive the agenda.
- ❑ Updated tools. Resources and technical support and funding opportunities for communities and businesses.

## **FY16 FOA Topics:**

- ❑ *EV Everywhere PEV Showcases;*
- ❑ *Workplace Safety; and*
- ❑ *Alternative Fuel Vehicle Community Partner Projects.*

## **EcoCAR 3:**

- ❑ Student designed vehicles evaluated by industry leaders at the Year 2 competition. Teams will focus on full development and integration on their designs in the third year of the competition.

***[www.vehicles.energy.gov](http://www.vehicles.energy.gov)***



U. S. Department of Energy

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**[Linda.Bluestein@ee.doe.gov](mailto:Linda.Bluestein@ee.doe.gov)**



## Vehicle Education

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## Legislative & Rulemaking

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